Task;

As someone with knowledge of chemistry, write a message that will provide the company with information that will enable them establish a facility.

Raw material; **air**

Process of production

Air is passed through air filters to remove dust from air, remaining air is passed through concentrated sodium hydroxide to remove carbon dioxide

Carbon dioxide + sodium hydroxide ⟶ sodium carbonate + water

Then air is passed through silica gel to remove water vapour.

Carbon dioxide and water vapour are removed because easily solidify at low temperatures to form ice that would block the pipes.

The remaining air is then compressed at very high pressure of -200 atmospheres, at a temperature of $200^{0}C$ to form liquid air.

Liquid air is distilled in a fractionating column where the components in it boil at different boiling points. Nitrogen boils at a lower boiling point and oxygen at the highest boiling point. Nitrogen boils at -$196^{O}C$ and is tapped off at an upper part of the column and collected in a steel cylinder.

Side effects of industry/danger, effect and mitigation.

Industry emits dangerous fumes to the atmosphere containing carbon dioxide which is a greenhouse gas that causes global warming. This

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can be mitigated by putting air filters in the chimney to absorb toxic/dangerous gases.

Industry produces a lot of noise which causes noise pollution mainly to workers .this results into damage of ears causing deafness. This can be mitigated by putting on noise protective gears to protect ears.

Social benefit

Provision of employment. This leads to gaining of income hence improving standards of living, etc.

Item 36

Following the outbreak of COVID 19, the cost for sanitizer increased suddenly and community members could not afford. A medical personnel was invited and advised them to use a cheaper alternative of using locally made ethanol since sanitizers contain mainly ethanol. The challenge is that the community members don't know how to produce ethanol locally.

Task;

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As a chemistry learner you have been invited to address the community challenge. Make a write up for your presentation

Raw materials;

Cassava (starch containing material), malt and yeast.

Process of production

Cassava is crushed to extract starch. Malt is added to starch in a plastic container and covered. Malt contains an enzyme diastase which catalyzes the hydrolysis of starch to maltose.

Starch +water ⟶ maltose

After about three days, yeast is added at room temperature. The maltase enzyme in yeast catalyzes the hydrolysis of maltose to glucose.

Maltose +water ⟶ glucose

Zymase enzyme in yeast hydrolyses glucose to crude ethanol and carbon dioxide

Glucose ⟶ ethanol +carbon dioxide

Crude ethanol is converted to pure ethanol by fractional distillation.

Side effects of the process/dangers encountered during the process

Process leads to emission of greenhouse gases like carbon dioxide which lead to global warming. This can be mitigated by fitting catalytic converters in the chimney of industry to absorb carbon dioxide.

Spilling of ethanol on the skin of workers, ethanol is corrosive thus causes wounds/injuries. This can be mitigated by putting on personal protective equipment.

Social benefits

Provision of employment. This leads to gaining of income hence improving standards of living, etc.

ITEM 37

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